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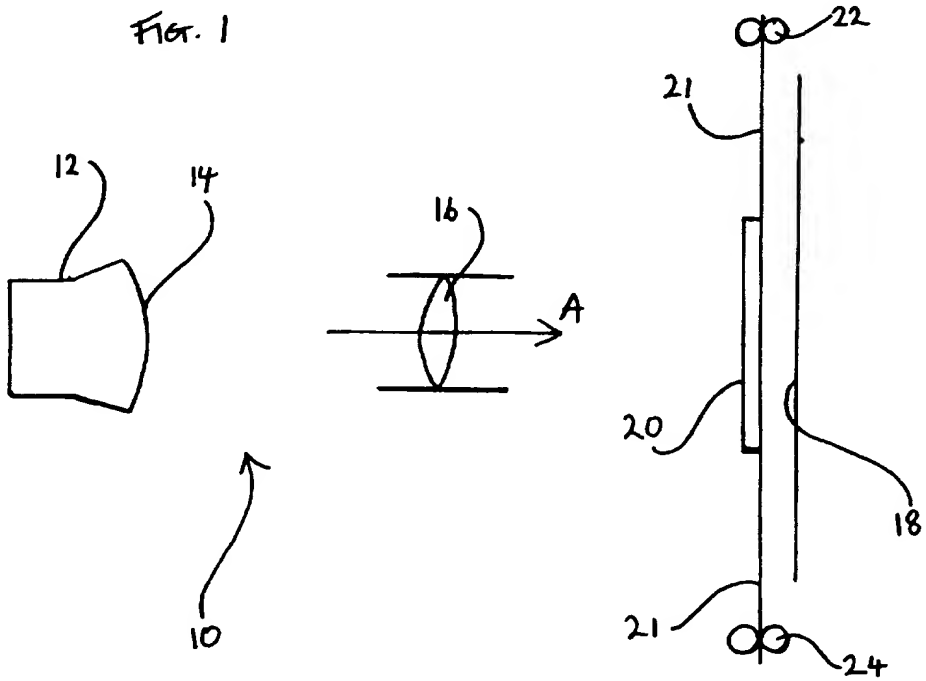
(54) Integrating a plurality of images

(57) Electronic display means 12 displays a plurality of images to be integrated, optical means 16 focuses the images at the location of image recording means 18, and a screen 20 divides each image for integrating the divided images on to the image recording means 18; the screen 20 and the recording means 18 are arranged for relative movement. The quality of the animation achieved by way of an animated parallax display created is greatly improved compared with displays of the prior art and in a particularly cost effective, simple and readily adaptable manner.

FIG. 1



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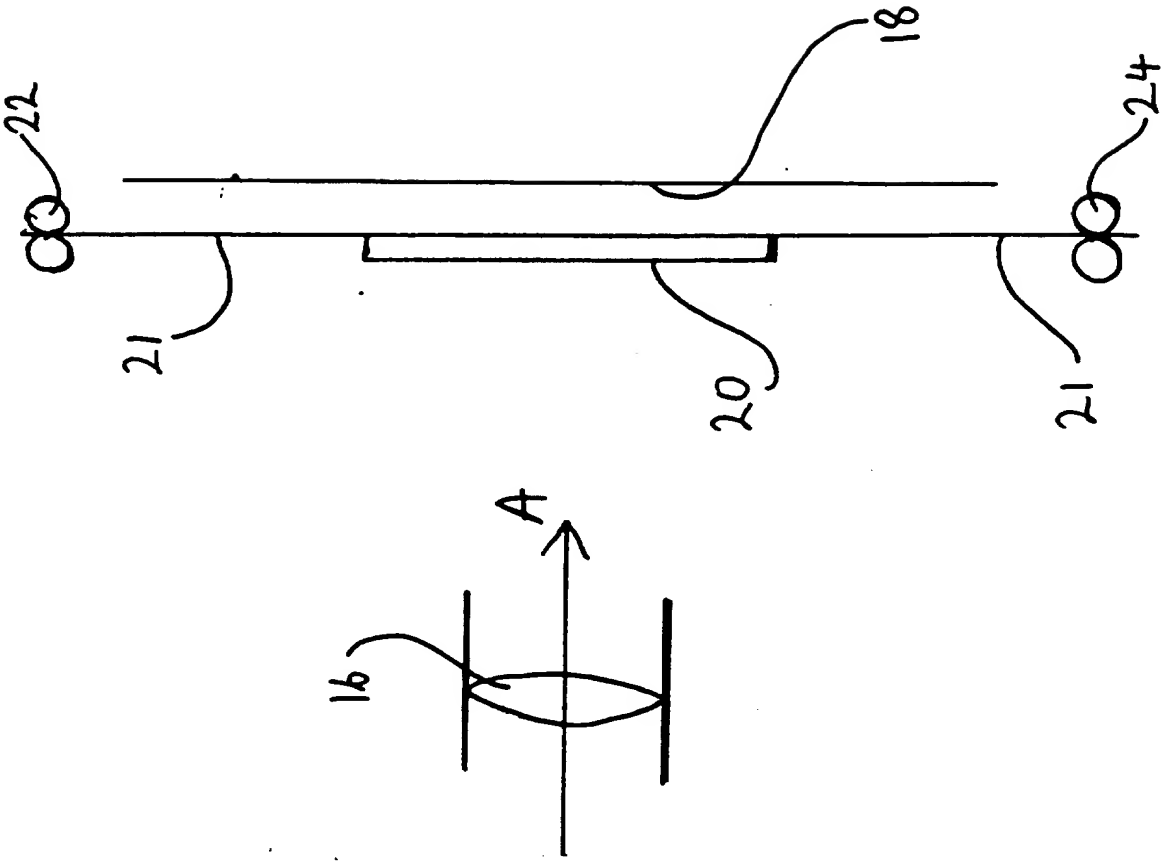


Fig. 1

FIG 2A

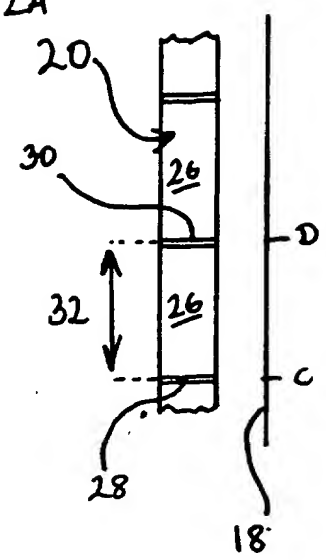


FIG 2B

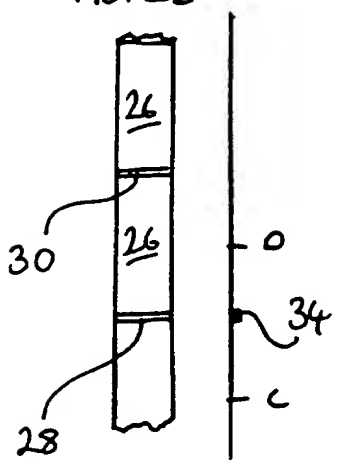


FIG 3

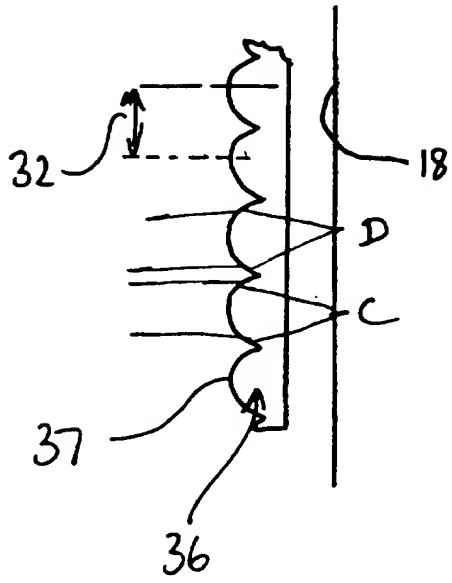
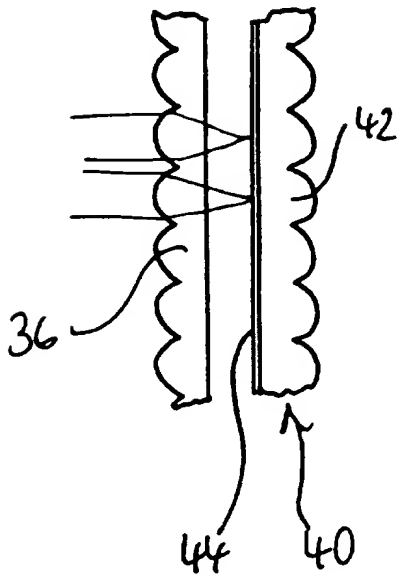


FIG. 4



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METHOD AND APPARATUS FOR INTEGRATING A PLURALITY OF IMAGES

The present invention relates to a method and apparatus for integrating a plurality of images.

The integration of a plurality of images is commonly required for producing a particular form of animated display commonly known as an animated parallax display.

Such displays currently comprise two or more integrated images provided on a single print which is located beneath a direction selective screen such as a lenticular screen or a grid such as a raster grid. Due to the predetermined refraction achieved by the screen or grid different ones of plurality of integrated images are visible depending upon the angle at which the display is viewed. As is commonly known, by twisting the display, or moving the screen or grid relative to the print, an animation effect can be achieved as the different images become visible. Dependent upon the type of images, and the direction of the screen or grid movement relative to the eyes of the observer, the observer will see either a change of image, a series of animations or a three-dimensional effect.

Currently available animated parallax displays are disadvantageously restricted however in view of the limited clarity and extent of animation that can be achieved. Thus, only basic movements such as an eye winking between open and closed positions, or basic limb movements, can be achieved and the animation effects therefore appear generally crude and uninteresting.

Such limitations arise since, due to the known methods of producing the integrated image, only a limited number of

individual images can be accurately combined and incorporated to form the integrated image.

Also, known methods of producing animated parallax displays produce displays in which the image disadvantageously appears as a staccato sequence rather than exhibiting smooth movement as appears in animated films etc.

Known methods of combining individual images so as to arrive at the integrated final image have involved using a stepped sequence of different images. This typically involves exposing individual images projected from a film strip on to a recording film emulsion through a matrix of narrow apertures such as those provided by a lenticular screen or raster grid. Each image is individually projected one after the other and, between each exposure, the lenticular screen or raster grid is moved a finite distance so that the next portion of the film emulsion is exposed at the time the next image is projected from the next frame of the film strip.

However, the number of images used in the aforementioned method is disadvantageously restricted in view of physical limits on the width of the apertures in the raster grid and, in particular, the relative accuracy with which a sequence of separate images can be directed on to the recording film emulsion whilst maintaining an accurate register of the parts of the various images that remain the same. It is these limitations that render it unduly expensive, inefficient and inappropriate to include more than a few frames in the final integrated image.

Further, the stop/start nature of the movement of the lenticular screen or raster grid and the projected film images disadvantageously limits the smoothness/continuity

that can be achieved in the resulting animated image sequence. Also, the use of a film strip as the source of the individual images to be divided and then integrated is disadvantageously prone to give rise to jitter in the final animated sequence due to the need to rely on the mechanical sprocket hole registration while running the film strip sequence.

Further, compared to simple animation sequences, stereoscopic effects depend on an even greater number of individual images and, for the aforementioned reasons, the quality of stereoscopic effects that can currently be achieved is disadvantageously limited in view of the manual effort and mechanical tolerances that arise in attempts to integrate a sufficient number of images with the required accuracy.

The present invention seeks to provide for a method and apparatus for integrating a plurality of images which do not exhibit limitations and disadvantages found in the prior art.

According to a first aspect of the present invention there is provided image integrating apparatus comprising means for displaying a plurality of images to be integrated, optical means for focusing said plurality of images at the location of image recording means, screen means for dividing each of said plurality of images and located between said optical means and said image recording means for integrating said plurality of divided images on to said image recording means, wherein said screen and said recording means are arranged for relative movement and said means for displaying said plurality of images comprises electronic display means.

The invention is advantageous in providing for an

integrating camera by which any required number of images can be captured from an electronic display system and directly transferred to the medium recording the integrated image.

The integrated image can therefore be captured directly from images being displayed such as a video sequence or from any other digitised or non digitised source and further image manipulation is not required.

The use of electronic display means is particularly advantageous in that the problems associated with the accurate registration of a sequence of separate frames that arises in the prior art is not experienced. By virtue of the very nature of the electronic display, accurate registration is achieved so long as the electronic display means is not accidentally moved during the capture of the image sequence. The limitation in the number of separate images that can then be integrated as experienced in the prior art does not arise and so a substantially greater number of images can be used with the present invention. Not only does this lead to an improved, i.e. smoother and more aesthetically pleasing, animation sequence in the animated parallax display, but the display can be produced and manipulated in a particularly efficient and cost effective manner which particularly enhances the scope for experimentation with the sequence and the introduction of special effects.

The present invention therefore provides for a particularly cost effective, accurate and efficient means for producing an animated parallax display which does not suffer disadvantageous limitations found in the prior art.

Preferably, the electronic display means comprises an electronic display screen which, in one embodiment, could

advantageously comprise an electro-optical screen such as a liquid crystal display screen.

In particular, the electronic display means may comprise a video monitor or computer video display unit and, more particularly, comprises a display screen upon which electronically recorded images can be displayed such as a CRT screen.

Thus, currently available video monitors/screens can therefore advantageously be readily incorporated for use with the present invention.

Advantageously, the relative movement between the screen means and said image recording means can be achieved in a stepped manner which is synchronised to the changes in the images on the display.

Preferably however, the relative movement between the screen means and the image recording means is achieved in a continuous manner at a substantially constant speed so that the divided portions of each image are advantageously swept across portions of the image recording means during the display of each particular image on the electronic display means.

The invention is therefore also provided with means for effecting the accurate continuous movement of the screen means relative to the image recording means during the time for which the particular sequence of images is displayed on the electronic display means.

This advantageously enhances the amount of control that can be achieved over the final integrated image and also enhances the quality of the final integrated image since, due to the continuous movement employed, the

vibrations and potential jitter in the final image that arise out of the stop/start nature of the stepped movement can be advantageously reduced and even avoided absolutely.

This therefore assists in providing a particularly smooth final animation sequence in the animated parallax display produced.

Advantageously, the image recording means is maintained stationary within the apparatus and the screen means is arranged for movement over the image recording means.

In this manner, any appropriate form of screen means such as a lenticular screen or raster grid can be advantageously employed for achieving the final integrated image.

As an alternative, the screen means can be locate stationary within the apparatus and the image recording means can be arranged to move adjacent the screen means.

As mentioned above, the screen means may comprise any appropriate means for dividing the plurality of images so as to create the required integrated image and, in particular, may comprise an optical grid, raster grid, an array of lenses and, in particular, a lenticular screen.

As is known from the prior art, the final integrated image produced is viewed by way of a directional viewing screen which may comprise a lenticular screen, such as a plastic reeded screen or a raster grid screen.

Further, the present invention can also be arranged for producing an animated parallax display in which a holographic optical element representing a raster screen is

employed for viewing the integrated image.

Preferably, the image recording means comprises photosensitive layer means which, in one particular embodiment, comprises a photographic emulsion.

According to one particular advantageous feature of the present invention, the image recording means is provided, on one side thereof, with a viewing screen such as the aforementioned lenticular screen. In particular, the image recording means can then comprise an emulsion coated lenticular screen or raster grid so that, upon development of the photographic emulsion so as to reveal the integrated image, the final animated parallax display is then also simultaneously produced and ready for use.

However, it should be appreciated that any appropriate form of image recording means can be employed including, for example, an electronic image-capture-device which can then advantageously produce an electronic signal representing the integrated image which can be further processed and employed to produce the final integrated image that appears in the required animated parallax display.

Advantageously, the electronic display means is arranged with means for manipulating the images to be displayed so as to enhance the quality of the final animation sequence viewed by way of the animated parallax display, or indeed merely to introduce special effects. In this manner, the electronic display means can advantageously include frame store means so that a selected one or more of the images displayed by the electronic display means can be selected for recording at the image recording means.

In this manner, a motion sequence can be divided into portions in which very little motion is occurring and then only a few images within the final integrated image can be devoted to such portions of potential less interest. This then advantageously frees image spaces of the integrated display for use with those portions of the motion sequence in which increased activity occurs.

The means for manipulating the image being displayed on the electronic display means can advantageously be arranged to provide special effects such as image enhancement, morphing, slow motion portions as discussed above, the insertion of titles or subliminal, or removal of specific intermediary frames in order to minimise motion blur effects, errors or to remove frames that might have a distorting effect on the final integrated image.

Advantageously, the apparatus of the present invention includes means for incorporating an audio output into the animated parallax display and which is synchronised for activation during the appropriate portion of movement of the animated parallax display. For example, the apparatus can be arranged so as to include a sound chip which is arranged for activation and for an audio emission which is relevant to the animation sequence being viewed when the animated parallax display reaches a particular angular inclination and so may advantageously employ a tilt switch, such as a mercury switch, so as to achieve the accurate activation of the sound chip.

Advantageously, the electronic display means is arranged to introduce an image into the integrated image, which, when visible, denotes that the audio sequence available will commence upon the appropriate movement of the animated parallax display.

According to another aspect of the present invention there is provided a method of integrating a plurality of images comprising displaying said plurality of images by way of electronic display means, focusing said plurality of images at means for recording an integrated image, dividing said plurality of images by screen means prior to receipt by said recording means and providing relative movement between said screen means and said recording means.

Advantageously, the relative movement between said screen means and said recording means is achieved in a continuous manner and, preferably, at a substantially constant speed.

Advantageously, the divided portions of the plurality of images are then effectively swept across regions of the recording means.

Advantageously, the electronic display means, screen means and image recording means of the above method can include any one or more of the features discussed above in relation to the apparatus of the present invention.

According to yet another aspect of the present invention, there is provided a recording member for recording an integrated image which member comprises a photographic-emulsion-coated animated parallax display viewing screen.

Advantageously, the emulsion coated screen comprises a lenticular screen or a raster grid.

This yet further aspect of the present invention is particularly advantageous in that an animated parallax display is readily achieved merely upon developing the integrated image captured by the photographic emulsion. In

particular, since such an emulsion, once developed, can be viewed from either side, the animated parallax display according to this further feature of the present invention is ready for immediate use particularly if the integrated image recorded on the photographic emulsion is recorded as a mirror-image of the final image to be observed.

According to still a further aspect of the present invention there is provided an animated parallax display having audio output means arranged to be activated responsive to angular movement of the display.

Advantageously, the display is arranged to present a starter image which represents a starting point for activation of the audio output means so as to achieve both the required motion sequence and also the appropriate synchronised audio output.

It will therefore be appreciated that the main advantage of the present invention arises from the use of a direct electronic image as the initial input which typically would be in the form of a CRT monitor, video projector or electronic display medium, and which also advantageously incorporates a continuously moving screen member serving to divide each image appropriately in front of the surface of an image recording means.

The use of such features provides for a particularly advantageously efficient, accurate, cost effective and adaptable means for producing a high quality smooth animated sequence in an animated parallax display.

The invention can advantageously provide a lenticular display capable of showing continuous animation and, or, three dimensional effects, derived from individual video frames and such a display in which the individual frames

are no longer discretely recognisable during the animation.

In particular, the invention can provide for a display in which the animation may have been previously manipulated to give selectively faster or slower animation, even within the same sequence, and in which frames may be "rotoscoped" in order to maintain subject position and size between adjacent frames.

Particular advantages arise from the invention comprising a integrating camera comprising a video monitor or projection screen onto which the electronic imaging sequence is displayed to be captured and, further, in which the camera comprises a grid or lenticular screen, or combination of both, is in continuous motion relative to the photographic emulsion or other image receiving surface.

Also, the invention readily allows for use of a screen pitch several times coarser than the final viewing screen in order to compress more detail into the final image.

With a particular example of the invention, the lens arrangement and film carrier may move relative to each other, so as to give an image shift greater than the pitch of one lenticle.

The invention is described further hereinafter, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a plan view of apparatus according to one embodiment of the present invention;

Figs. 2A and 2B show respective positions of the screen member of the apparatus of Fig. 1 during recordal of an integrated image;

Fig. 3 shows an alternative form of screen member for use with the present invention; and

Fig. 4 shows a particularly advantageous form of recording member for the integrated image.

Referring to Fig. 1, there is shown apparatus 10 for integrating a plurality of images and which comprises an electronic display device 12 such as a cathode ray tube having a screen 14 and which is arranged to display on screen 14 a continuous motion sequence comprising a plurality of images to be divided and then integrated into a single integrated image of a photographic emulsion of an animated parallax display as will be described further.

The sequence of images appearing on the screen 14 is delivered in the direction of arrow A through a lens arrangement 16 such as a flat field lens which serves to focus the images at the location of a photographic emulsion 18.

Located in front of the photographic emulsion 18, when considering the direction of arrow A, there is provided an aperture plate 20 in the form of a raster screen or raster grid which serves to intercept the images delivered from the lens arrangement 16 prior to their arrival at the photographic emulsion 18.

As will be appreciated later from a consideration of Figs. 2A and 2B, the aperture plate 20 comprises a flat opaque plate having an evenly spaced series of transparent slits therein which allow for corresponding slits of each image appearing on the screen 14 to be received by correspondingly spaced narrow strip portions of the photographic emulsion 18.

Thus, by virtue of the movement of the aperture plate 20 in the direction of arrow B as shown in Fig. 1 during the display of the sequence of images on the screen 14, each image as it appears on the screen 14 can be divided by the aperture plate 20 and delivered to different locations on the photographic emulsion 18. Once the display of the sequence on the screen 14 is complete, and the travel of the aperture plate 20 in the direction of arrow B has occurred to its full extent, the photographic emulsion 18, once developed, contains an integrated image comprising strip portions of each of the images appearing on the screen 14. A shutter (not shown) can also be incorporated into the light path indicated by arrow A so as to assist the control of the recordal of the integrated image.

In order to form the final animated parallax display, it is merely necessary to overlay the photographic emulsion 18 with a direction selective viewing screen such as a raster screen or a lenticular screen having a pitch which, in this example, corresponds to the pitch of the aperture plate 20.

Upon pivoting the animated parallax display in the normal manner, an animation sequence can then be observed as the direction selective viewing screen brings the strips of each of the various images of the sequence obtained from screen 14 into view.

The aperture plate 20 is arranged to be mounted on mounting supports 21 which engage with driving means 22, 24 so as to achieve smooth and accurate travel of the aperture plate 20 in the direction of arrow B during the display of the image sequence on the screen 14.

Particular advantages arise in the present invention through the use of an electronic display 12 rather than a

projected film display since the accuracy and simplicity with which a relatively large number of images can be recorded on the photographic emulsion 18 is greatly increased and problems associated with the correct registration of a series of images do not arise.

Also, since the drive means 22, 24 can be readily arranged to move the aperture plate 20 continuously at a constant rate during the display of the image sequence on the screen 14, the present invention does not experience the further disadvantages that arise in the prior art due to the encremented, or stepped, nature of the movement of the aperture plate 20.

Referring now to Figs. 2A and 2B, there is shown, in enlarged detail, a portion of the aperture plate 20 of Fig. 1 overlying the photographic emulsion 18.

Referring first to Fig. 2A, it can be appreciated that the aperture plate 20 has a series of opaque regions 26 separated by a series of transparent slits 28, 30 etc which are separated by an equal distance, i.e. pitch, 32. Assuming that, in Fig. 2A, one of the plurality of images appearing on the screen 14 is currently being displayed, it would be appreciated that narrow strips of this image will appear through the apertures 28, 30 of the aperture plate 20 and be recorded at locations C, D, of the photographic emulsion 18. A further advantage can arise in the present invention in that, assuming continuous motion of the aperture plate 20 in the direction of arrow B is occurring, for the, albeit extremely short, time that the particular image is appearing on the screen 14 the apertures 28, 30 of the aperture plate 20 travel relative to the photographic emulsion 18 so as to sweep portions of the image across the regions C, D, of the photographic emulsion 18.

During the display of subsequent images of the image sequence appearing on the screen 14, the aperture plate 20 has moved further in the direction of Arrow B so that, for example, the aperture 28 in the aperture plate 20 that was previously responsible for recording an image strip at C is now located over location 34 of the photographic emulsion 18.

In this manner, a complete series of adjacent strips are recorded on the photographic emulsion 18 between the locations C and D and each of which corresponds to a strip portion of one of the images appearing in the image sequence on the screen 14.

As will be appreciated, in order to prevent double exposure of the photographic emulsion 18, the maximum movement of the aperture plate 20 in the direction of Arrow B during the image sequence appearing on the screen 14 is generally arranged to correspond to the pitch 32 of the apertures 26, 28 of the aperture plate 20, i.e. the distance between point C and D on the photographic emulsion 18.

Turning now to Fig. 3, there is shown an alternative form of aperture plate 20 which comprises a lenticular screen 36.

The lenticular screen 36 comprises a completely transparent screen which is formed of an array of lenticular lenses 37 and in which the pitch of the array of lenses 37 can be of a similar nature as the pitch 32 of the form of the aperture plate 20 illustrated in Figs. 1, 2A and 2B which, for example, comprises a raster screen.

Returning to Fig. 3, it will be appreciated that the use of a lenticular screen 36 as the aperture plate 20 can

prove particularly advantageous since the complete image, rather than strips thereof, appearing on the screen 14 is delivered to the photographic emulsion 18 since the lenticular screen 36 does not include any opaque regions. This can further enhance the quality of the image that eventually appears on the animated parallax display.

Further, the use of a lenticular screen 36 as the aperture plate 20 also advantageously provides for the option of moving the photographic emulsion 18 rather than the lenticular screen 36. As such, the photographic emulsion 18 is mounted for optical engagement with drive means which, in view of the different nature of the photographic emulsion 18 as compared with the aperture plate 20 in the form of a lenticular screen 36, advantageously assists in providing for an accurately controlled, and smooth, movement of the photographic emulsion 18 relative to the aperture plate 20.

Also, the use of the lenticular screen 36 has a further advantage in that the formation of such a screen does not necessarily suffer the processing restrictions which arise when producing the aperture plate 20 and which restrict the dimensions of each of the apertures and also the pitch which can be achieved.

Finally, turning to Fig. 4, there is illustrated one particular advantageous embodiment of the means for receiving the image from the screen 14. In the embodiment of Fig. 4, the means for receiving the image comprises an emulsion coated lenticular screen 40 in which, as will be appreciated, a lenticular screen 42 has its rear surface coated with a coating of photographic emulsion 44.

Since, when developed, the photographic emulsion 44 can be viewed from either side, the photographic emulsion

coated lenticular screen 40 can be exposed in the normal manner with reference to Fig. 3 by use of a lenticular lens 36. As will be appreciated, once the integrating of the image is complete, and the photographic emulsion 44 developed, the integrated image is immediately ready for viewing by way of the lenticular lens 42 already attached to the photographic emulsion.

However, in order to achieve the correct appearance of an animation sequence, the sequence is recorded on to the photographic emulsion 44 as a mirror image of the actual sequence required.

As a further alternative, an image sequence can be delivered to an emulsion coated lenticular screen by projecting the image sequence through the lenticular screen itself. Relative parallel or lenticular rotational movement between the lens and the emulsion coated lenticular screen is achieved such that the entire emulsion area under each lenticle is swept and filled with images.

The net result of the present invention is that an animated parallax display can be produced in a relatively simple and cost effective manner and which allows for a wide degree of experimentation so as to arrive at the most appropriate sequence of images for the animation required. In particular, the resulting image appears as a continuous exert from, for example, a video, rather than the somewhat jerky effect of a flip book or animated parallax display according to the prior art. The recording from the electronic monitor directly to the receiving surface such as the photographic emulsion, eliminates the possibility of image alignment error in all directions.

Further, if individual monitor images are to be isolated, for combining in a particular sequence, these may

be held on the monitor for a finite period of time and the film then exposed. During this time, the driven aperture plate, or alternatively photographic emulsion, is held static prior to microstepping the drive through a fixed distance before exposure to the next frame. The use of static images on the electronic display screen 14 ensures correct registration between frames without requiring manual re-alignment.

As mentioned above, the use of an electronic display in accordance with the present invention allows for the ready manipulation of the image sequence prior to being recorded on the photographic emulsion. Thus, special effects such as image enhancement, morphing, slow motion portions, the insertion of titles or subliminal frames, or the removal of specific intermediary frames in order to minimise motion blur effects or errors can be achieved.

Blank frames may also be inserted to emphasise animation effects and certain key frames may be repeated to emphasise those frames and increase resolution. In particular, the use of electronic image manipulation allows for so-called rotoscope effects in order to maintain subject position, and size, within a particular sequence and thereby improving the animation effects.

Also, medical images may be enhanced in contrast and colour to emphasise specific areas of interest.

According to whether the aperture plate moves parallel to, or at right-angles to, the direction of motion displayed on the electronic display 14, three-dimensional effects can also be included in the animation. However, great care has to be taken to ensure that any horizontal motion in a scene is not confused with depth parallax information. If stereoscopic effects are required, the

aperture plate and the eventual lenticular viewing screen used with the animated parallax device need to be placed such that the grid lines, or identical lenses, run parallel, rather than at right angles, to the direction of image rotation compared to recording a purely two-dimensional animation in which case either direction of travel is permitted.

To enhance and increase the amount of information which may be encoded into the final image, the pitch of the screen through which the master is created, and therefore the size of the master image, may be increased by a factor several times greater than that of the final product, provided replay of the image sequence is through a lenticular screen having a lens array of matching integers.

As a further feature, and in order to assist in the elimination of the moire effect of strobing, and screen clash, caused by interference patterns created between the line frequency and typically between the red/blue/green matrix of the electronic display 14, and the frequency of the scan lines, the pitch of the recording screen and any subsequent printing screens, either the lens arrangement 16, or the aperture plate arrangement 20, may be traversed during exposure relative to the film. An alternative arrangement to achieve these further advantageous effects would be to electronically oscillate the image being recorded in a direction relative to the direction of the scan lines of the image.

CLAIMS

1. Image integrating apparatus comprising means for displaying a plurality of images to be integrated, optical means for focusing said plurality of images at the location of image recording means, screen means for dividing each of said plurality of images and located between said optical means and said image recording means for integrating said plurality of divided images on to said image recording means, wherein said screen and said recording means are arranged for relative movement and said means for displaying said plurality of images comprises electronic display means.

2. Apparatus as claimed in Claim 1, wherein said electronic display means comprises an electronic display screen.

3. Apparatus as claimed in Claim 3 wherein said electronic display means comprises a video monitor.

4. Apparatus as claimed in any one of Claims 1, 2 or 3, wherein the relative movement between the screen means and the image recording means is achieved in a continuous manner at a substantially constant speed.

5. Apparatus as claimed in any one of the preceding claims, wherein the image recording means is maintained stationary within the apparatus and the screen means is arranged for movement over the image recording means.

6. Apparatus as claimed in any one of Claims 1 to 4, wherein the screen means can be maintained stationary within the apparatus and the image recording means can be arranged to move adjacent the screen means.

7. Apparatus as claimed in any one of the preceding claims, wherein the screen means comprises a lenticular screen.

8. Apparatus as claimed in any one of the preceding claims, wherein said image recording means is provided on one side thereof with a direction selective viewing screen.

9. Apparatus as claimed in Claim 8, wherein said image recording means comprises a photographic emulsion coated lenticular screen.

10. Apparatus as claimed in any one of Claims 1 to 7, wherein said image recording means comprises an electronic image-capture-device.

11. Apparatus as claimed in any one of the preceding claims and provided with means for manipulating the images to be displayed on said electronic display means.

12. Apparatus as claimed in Claim 11, wherein said means for manipulating the image being displayed on the electronic display means can advantageously be arranged to provide special effects in the image displayed.

13. Apparatus as claimed in any one of the preceding claims, and including means for incorporating an audio output into the animated parallax display and which is arranged for activation during the appropriate portion of movement of the animated parallax display.

14. Apparatus as claimed in Claim 13, wherein the electronic display means is arranged to introduce an image into the integrated image which denotes a proper starting point for the audio output.

15. A method of integrating a plurality of images comprising displaying said plurality of images by way of electronic display means, focusing said plurality of images at means for recording an integrated image, dividing said plurality of images by screen means prior to receipt by said recording means and providing relative movement between said screen means and said recording means.

16. A method as claimed in Claim 15, wherein the relative movement between said screen means and said recording means is provided in a continuous manner.

17. A recording member for recording an integrated image which member comprises a photographic-emulsion-coated animated parallax display viewing screen.

18. A recording member as claimed in Claim 17, wherein the emulsion coated screen comprises a lenticular screen.

19. An animated parallax display apparatus having audio output means arranged to be activated responsive to angular movement of the display.

20. Apparatus as claimed in Claim 19, and arranged to present a starter image which represents a starting point for activation of the audio output means so as to achieve both the required motion sequence and also the appropriate synchronised audio output.

21. Apparatus as claimed in Claim 19 or 20 and having tilt sensitive means for controlling operation of said audio output means.

The Patent Office

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Application No: GB 9516033.9
Claims searched: 1 to 16

Examiner: John Donaldson
Date of search: 1 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4F(FAAC, FAAG, FAAX, FCP, FCQ, FCW, FDD)

Int Cl (Ed.6): H04N 5/00, 5/222, 5/262, 5/76, 5/84, 7/00, 13/00, 13/04

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2271903 A (SHARP), see page 13, line 9 to page 15, line 4	1, 5, 8, 9, 11, 12, 15
X	GB 1468742 (M I T), see page 3, line 90 to page 4, line 49	1, 4, 6, 11, 12, 15, 16

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.